

process (HDCI) of PCB as a function of the systematical increasing temperature could be formulated. Highly chlorinated organic compounds, i.e. decachlorobiphenyl (CB 209) and a technical mixture of PCBs (Aroclor 1254), were subjected to reductive pyrolysis in a flow of hydrogen in the presence of a catalyst. A number of nickel catalysts on carbon and silica were prepared using an optimized spray drying technique. A commercial carbon supported palladium catalyst was also tested. Pd/C leads to a complete removal of chlorine from CB 209 and to a smaller extent from Aroclor 1254 and at a much lower temperature than for the Ni/C catalysts. The HDCI of Aroclor 1254 and CB 209 catalysed by Ni/C starts at 300 and 350°C, respectively. The highest removal of chlorine is achieved using Ni/C catalyst with the lowest amount of NiO being 3 wt%. While nickel on silica support is found to be inactive for the HDCI reaction under the conditions of AP-TPR analysis. AP-TPR-MS study shows that biphenyl structure is decomposed to benzene, toluene, styrene and propenyl benzene with a maximum evolution temperature higher than the HDCI process but depending on the catalyst and PCBs. It can be concluded that AP-TPR method can be considered as a simple method for preliminary testing the activity of catalysts for HDCI process.

#### 06/02025 Sulfur removal from original and acid treated lignites by pyrolysis

Uzun, D. and Özdoğan, S. *Fuel*, 2006, 85, (3), 315–322.  
Six original, three hydrochloric acid treated and three demineralized lignite samples were pyrolysed at seven different temperatures between 350 and 950°C for 7 min under evolved gas atmosphere. All samples and their chars were analysed quantitatively for their total sulfur content and pyritic, sulfate and organic sulfur forms. The alkaline oxide contents of original lignites and their hydrochloric acid treated counterparts were determined. The results clearly indicate that calcium and sulfurous compounds in the parent lignites undergo various chemical changes during pyrolysis. The pyrolysis temperature, types of sulfur and calcium compounds, all affect the behaviour of sulfur during pyrolysis. Higher pyrolysis temperatures favour total sulfur removal for all lignites, reaching 30–54% around 850 and 950°C. HCl treatment and demineralization decreases calcium contents, hence, increases quantitative sulfur removal from the lignites by pyrolysis. The maximum total sulfur removal from acid treated lignites is observed as 77%. The ratios of the total sulfur to heating value decreases with increases of pyrolysis temperature up to around 600°C for acid treated lignites and no major changes are observed at higher pyrolysis temperatures; no common behaviour is observed for original lignites.

#### 06/02026 The possible role of fissure formation in the prevention of coking pressure generation

Hanson, S. *et al. Fuel*, 2006, 85, (1), 19–24.  
Fissure patterns have been studied for both high-volatile, low-coking pressure coals and low-volatile, high-coking pressure coals. The high-volatile coals form an extensive pattern of interconnected fissures, which seem to form early on and extend further toward the plastic region than the low-volatile coals, which form only a few fissures that do not extend very far into the charge. It is proposed that the combination of high-fluidity and extensive fissure network present for high-volatile coals may assist in allowing continual release of volatiles throughout the coking process and play a part in preventing the generation of high gas pressures. It was also found that a higher proportion of the volatiles for the low-volatile, high-coking pressure coals is released after the coal has been converted to semi-coke, which may play a role in preventing the effective release of gas.

## Economics, business, marketing, policy

#### 06/02027 Decomposing electric power plant emissions within a joint production framework

Pasurka, C. A. *Energy Economics*, 2006, 28, (1), 26–43.  
This study calculates the relative importance of factors associated with changes in NO<sub>x</sub> and SO<sub>2</sub> emissions by coal-fired electric power plants between 1987 and 1995 using distance functions to model the joint production of good and bad outputs. This new decomposition model calculates changes in emissions (the bad outputs) associated with changes in technical efficiency, technical change, growth of fuel and non-fuel inputs, and changes in the mix of good and bad outputs. This study finds that declining SO<sub>2</sub> emissions are primarily associated with changes in the output mix, while declining NO<sub>x</sub> emissions are associated with declining fuel consumption and changes in the output mix.

#### 06/02028 Preferences for domestic fuel: analysis with socio-economic factors and rankings in Kolkata, India

Gupta, G. and Köhlin, G. *Ecological Economic*, 2006, 57, (1), 107–121.

The choice of domestic fuel is a matter of great concern for households and policy makers in India. This paper investigates the demand for domestic fuels when households face four choices: fuelwood, Coal, Kerosene and LPG. The study is based on a survey of 500 households in Kolkata, India. The demand estimates are conducted using a two-stage process where the first stage investigates choice and the second the quantity used. Determinants of fuel demand are identified and their relative importance shown. Extending the study, the paper also analyses the choice of the main cooking fuel in terms of the households' stated rankings of six fuels for five attributes. The policy discussion indicates that subsidies have less potential to reduce polluting fuels such as coal and fuelwood due to weak cross-price elasticities, while increased availability of LPG and potentially also increased awareness of indoor air pollution have greater prospect.

## Derived solid fuels

#### 06/02029 Carbon-based novel sorbent for removing gas-phase mercury

Lee, S. H. *et al. Fuel*, 2006, 85, (2), 219–226.  
The purpose of the present study is to develop a carbon-based sorbent for removing gaseous mercury. Existing commercial activated carbon for removing mercury is superior in efficiency but expensive. This study attempted to develop a cost-effective sorbent using petroleum coke, which is low-priced carbon source. It took note that the sulfur content of domestic petroleum coke is around 7%. Sulfur is a superior reaction material in removing mercury and it has been usually impregnated into activated carbon for use. Sulfur in petroleum coke is strongly stuck to carbon matrix, so it is not reactive as itself. This study applied high-temperature pyrolysis to petroleum coke to make its sulfur take out of the surface of the petroleum coke and used the sulfur in removing mercury. According to the result of the experiment, the specific surface area of petroleum coke increased around 10 times in the course of pyrolysis and the efficiency of mercury removal was significantly improved as part of sulfur taken out. Thus, pyrolysed petroleum coke was considered to have high potential as a sorbent for removing mercury.

#### 06/02030 Flameless incineration of pyrene under sub-critical and supercritical water conditions

Onwudili, J. A. and Williams, P. T. *Fuel*, 2006, 85, (1), 75–83.  
Pyrene was used as a typical four-ring polycyclic aromatic hydrocarbon (PAH), to investigate the mechanisms and incineration behaviour of large organic molecules in a batch supercritical water oxidation reactor using hydrogen peroxide as oxidant. The distribution of carbon as gaseous species and organic species in relation to the temperature and pressure, and reaction time was monitored. The results showed that at 200°C, pyrene was only slightly decomposed but as the temperature increased to 250°C and then to 280°C, carbonization and thermal cracking became prevalent leading to char formation and decomposition of pyrene to phenanthrene, and later naphthalene. Rapid dissolution and oxidation of the char and organic species started occurring from 300°C. Increasing reaction time resulted in increased formation of carbon dioxide and carbon monoxide. Initially high product formation of phenanthrene at short reaction times was followed by high decomposition of the organic products in solution as the reaction conditions became progressively more severe. Oxygenated organic species such as aldehydes, ketones, phenols, xanthone, and benzoic acid were identified as the temperature and reaction times were increased between 300 and 380°C. From the analytical results obtained, carbon mass balances were calculated for each experiment. A proposed mechanism for the observed oxidative decomposition of pyrene is also reported.

#### 06/02031 Influence of the permeability of the coal plastic layer on coking pressure

Casal, M. D. *et al. Fuel*, 2006, 85, (3), 281–288.  
Ten coals of different rank and coking pressure characteristics were chosen in order to study the time of occurrence of the phenomena that take place during the coking of a coal and the way they affect the generation of dangerous coking pressures. Parameters derived from thermoplastic, thermogravimetric and permeability tests were studied together with semicoke contraction and the coking pressure generated by the coals in a movable wall oven. It was found that for safe coals, the maximum evolution of volatile matter occurs near the temperature of maximum fluidity. The position of the maximum rate of volatile matter evolution with respect to the zone of low permeability varies depending on the coking pressure characteristics of the coals. In addition, the relationship between the period of low permeability to the resolidifica-